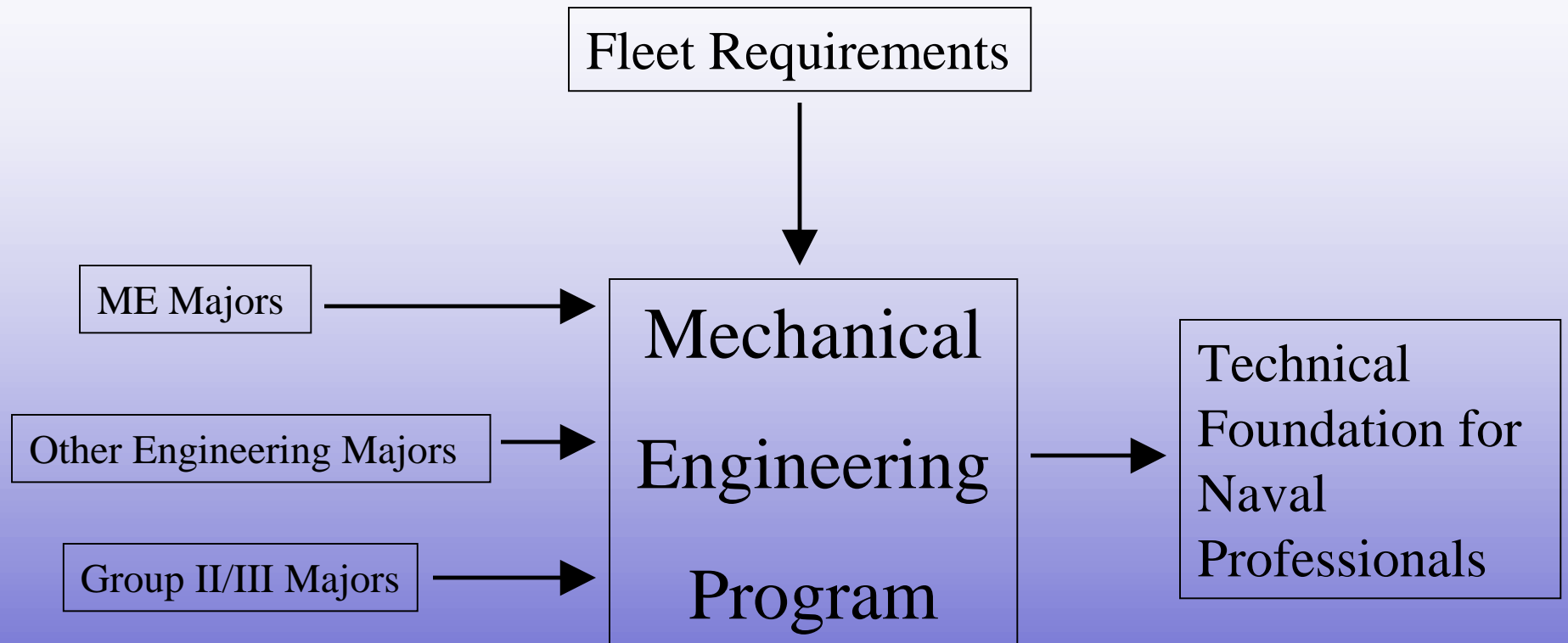


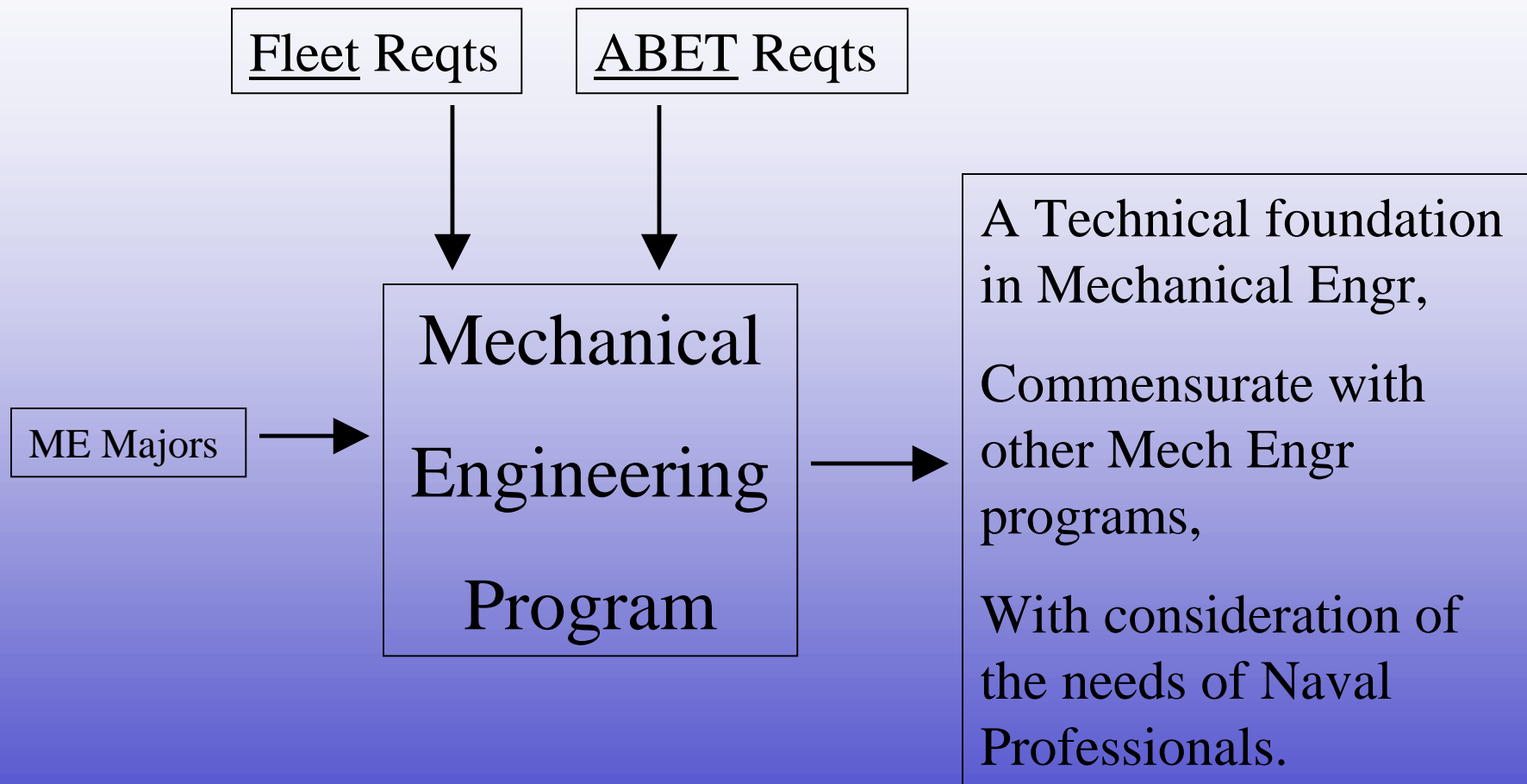
# Mechanical Engineering Town Meeting



# Agenda

- Perspective on the ME major
- Special opportunities for ME majors
- Tracks and electives
- Questions







## Technical Foundation In Mechanical Engineering

# Flexibility

- Oversee the operation and maintenance of weapons systems as unrestricted line officers.
- Be competitive for admission to graduate studies in technical or engineering fields.
- Possess the skills needed to transfer to the engineering specialties of the service (EDO/ AEDO/ CEC).
- Pursue licensure as a professional engineer (PE)
- Appreciate the tasks required for engineering design and
  - Continue to grow in competence toward being a design engineer or,
  - Become an engineering manager.
- Apply a disciplined engineering thought process in areas unrelated to engineering or project management.

# *Your Future*

- The **Mechanical Engineering** program provides its graduates



with an **optimal flexibility**  
**to pursue a wide range of career choices.**

- The limitations you have are those you accept for yourself.

# Professional Engineer (PE)

- **Requirements**

- Pass the Fundamentals of Engineering Exam (spring 1/c year).
- 4 years of experience.
- Pass the Principles and Practice of Engineering Exam administered by each state.

- **Benefits**

- Beneficial in the ED, AED, and CEC fields.
- Average civilian salary differential is 13% higher for PE's.
- Allows one to legally act as an "Engineering Consultant."



# Design Engineer

- “Design engineer” is the most demanding job classification for most engineers.
- Unrestricted line officers typically do not engage in design during their careers.
- “Design” for the Navy and Marine Corps is conducted primarily by civilian employees and contractors for the various branches of Naval Sea Systems and Naval Air Systems Commands.
- Member of the ED, AED, and CEC communities DO engage in design activities.

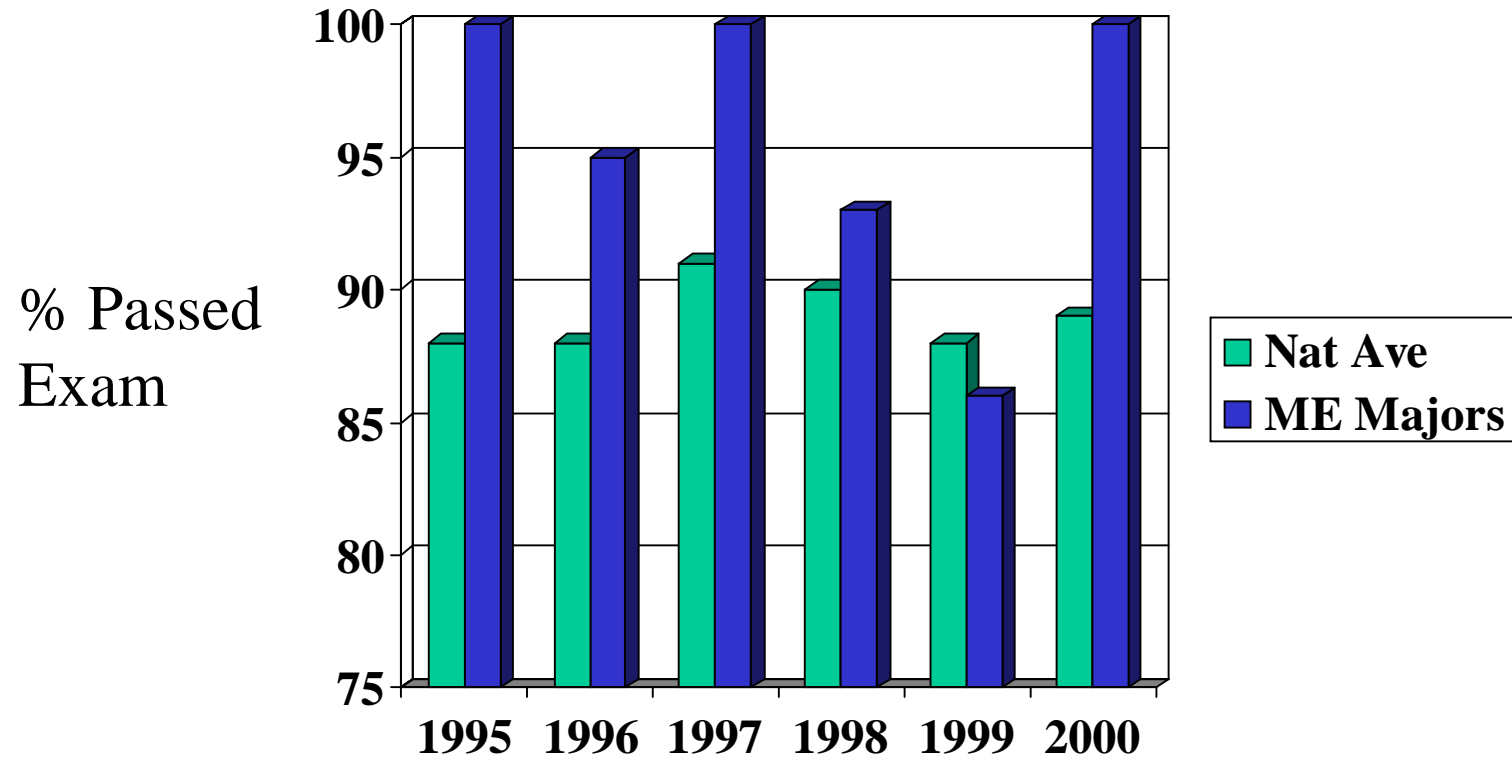
# Naval Professionals and Engineering

- As URL officers, engineering knowledge and skills help to operate and maintain weapons systems.
- Many URL officers shift to other warfare communities:
  - ED, AED, and CEC officers require a strong technical education.
  - Engineering backgrounds are viewed favorably in the selection process of Intelligence and Cryptography officers.
- Senior Officers have the opportunity to specialize in acquisition and program management of major weapon systems.
  - They act as “Engineering Managers.”

# Fundamentals of Engineering (FE) Exam

- 1<sup>st</sup> Step in Process for Prof Engr (PE) License
- PE License is desirable for many Navy/Marine Corps positions and for follow-on careers after Navy/Marine Corps
- Cost is \$121 (for '01 exam), paid by MIDN. In '02, MIDN have option of paying out of their "Fixed Account"
- 8 hr, multiple choice exam given in Apr of 1/C year at USNA
  - AM Topics: Math, Chemistry, Computers, Statics, Dynamics, Materials Science, Thermo, Fluids, Engr Econ, Elec Engr'ng
  - PM Topics: General Exam topics (same as AM) or Pick the Mech Engr Exam
- Key Dates/Times: Apply in Nov of 1/C year; Exam in Apr 1/C year
  - EM 380 taught in Spr 1/C year – review of all general subjects
- You are best prepared for this exam while here – take advantage of this opportunity!!!

## USNA ME Majors, FE Exam Results 1995 - 2000



# ME Dept Summer Internships

- 4 Week Internships in 1/C Summer; Get cruise “credit”
- Agencies Participating
  - NAVSEA 92C (Alexandria, VA)
  - NASA Johnson Space Center (Houston, TX)
  - US Special Ops Command (Little Creek Amphib Base, VA)
  - US Army Corps of Engrs (Baltimore, MD District)
  - Naval Dosimetry Center (Bethesda, MD)
- POCs: MAJ Hazel & Assoc Prof Tuttle
  - Prof Nelson (Naval Dosimetry Center)
- Timeline (in 2/C year): Jan – apply thru POC; Feb – Positions announced

# Independent Research Course (EM495)

- 1-3 unit independent research project on topic selected by student or instructor
- Requirement: 3.0 projected QPR
- Replaces major elective in matrix in 1/c year

# Recent Independent Research Topics

- Evaluation and Design of Heat Pipes for High Temperature Applications (Harper and Lindler)
- Passive Vibration Control of a Cantilevered Beam with Piezoelectric Films (Burkhardt)
- Feasibility of a New Power Generation Cycle (Volino)

# More Independent Research Topics



- Development of a Precracking Machine for Notched Round Bars (Link)
- Microstructure Evaluation of Filled-Hole Composites (P. Joyce)
- Development of a Compact Solar Water Heater for Heat Transfer lab (Flack)
- Optical Microscopy and Mechanical Testing of Composite Materials (A. Moran)

# Trident Scholars

- Top 10% of class at end of 1st semester 2/c year
- Replace approximately 50% of course work w/ substantial independent research project
- Helps to be ahead of matrix, but not a must
- Approximately 8-12 awarded per year
- 1990's: 19 from Mechanical Engineering (108 for entire Academy)

# Trident Scholar Projects

- Optimizing the Strength and Stress Corrosion Cracking Resistance of Aluminum Alloys Used for Refurbishing Aging Aircraft
- Development of an Inverse Ultrasonic Radiative Transfer Technique
- The Use of MEMS to Detect Vibrations Associated with Abnormal Scroll Compressor Operation

# More Trident Scholar Projects

- Effects of Thermal Shock on Pressure Transducers in Internal Combustion Engines
- Improved Turbine Blade Cooling using Endwall Flow Modification
- Design, Construction and Analysis of a Flat Heat Pipe
- The Use of Thermal Spraying to Enhance the Bonding Characteristics of a Urethane Coated Propeller

# HONORS, AWARDS, and PRIZES

## Commander James Edward Palmer Prize

- Wrist watch and Plaque
- ME major with Top grades in Eng and Math

## American Society of Mechanical Engineers

### Design Award

- ASME Gift Certificate and Plaque
- Best senior design project

## Captain Frederick A. Edwards, Sr. Class of 1923, Award

- Binoculars, Plaque, Cash
- Marine Eng major with highest CQPR

# **HONORS, AWARDS, and PRIZES**

## **American Society of Naval Engineers Prize**

- Dress Sword
- Marine Eng major - highest grades Eng, Math & Sci

## **Marine Engineering Design Award**

- Savings Bond and Plaque
- Individual or team members, Marine Eng, best design

## **Trident Scholars**

## **Mechanical Engineering Dept Distinguished Graduate**

# Mechanical Engineering Societies

- **SAE – Society of Automotive Engineers**
  - Requirements: Any MIDN, Join national SAE
  - Cost: \$10/year
  - Benefits: Work on SAE Formula I competition, USNA Go-Cart racing team, Attend SAE conferences, USNA lectures, Free magazine
  - POC: LT Gish, CDR Carr, MIDN 1/C Murray

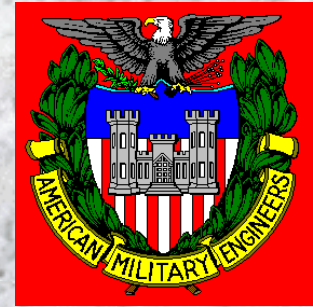


- **ASME – American Society of Mechanical Engineers**
  - Requirements: Any MIDN
  - Cost: \$20/year, \$10 for half year
  - Benefits: Compete in regional and national design contests, Travel to regional student conferences, Plant trips, Lectures, Free magazine
  - POC: PROF Volino, MIDN 1/C Dull



- **SAME – Society of American Military Engineers**

- **Requirements:** Any MIDN
- **Cost:** Free 1<sup>st</sup> year, \$20/year later years
- **Benefits:** Field trips, Guest speakers, National and district meetings, Free magazine
- **POC:** MAJ Hazel, MIDN 1/C Garas



- **Pi Tau Sigma – National Mechanical Engineering Honor Society**

- **Requirements:** CQPR≥3.0, No D or F grades in math science or engineering, Top 20% of 2/C, Top 33% of 1/C
- **Cost:** \$30 one time
- **Benefits:** Recognition of academic excellence, Opportunity for USNA FIRST Robotics Team, Opportunity for travel to national meeting
- **POC:** PROF Miner



# Voluntary Graduate Education Program (VGEP)

- Earn MS at local university in one calendar year (start in January of 1/C year)
- Validators (CQPR > 3.2)
- Apply for program in JAN of 2/C year
- Schools: JHU, UMD-CP, CUA
- Additional Obligation of 3 years  
USN – concurrent with USNA obligation  
USMC – consecutive to USNA obligation
- POC: Prof. Palmer

# Immediate Graduate Education Program (IGEP)

- **Earn MS at civilian university** (start after graduation from USNA)
- **25 per graduating class** (ALL majors)
- **CQPR > 3.2**
- **Apply for program in SEPT of 1/C year**
- **Recent schools:**  
Berkeley, Ga Tech, Michigan, MIT, Stanford, UT-Austin, UVA
- **Additional Obligation of 3X length of MS program** (concurrent for USN; consecutive for USMC)
- **POC: Prof. Palmer**

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

The background of the slide is a photograph of a mechanical assembly. It features a metal plate with several circular holes, a gear-like component, and a vertical rod. The entire assembly is set against a background of a grid pattern, likely a technical drawing or a measurement grid.

## Mechanical Engineering Design Continuum

### Design Backbone

EM215  
EM375  
EM371  
EM477  
EM472

### Support Courses

EM217  
EM313  
EM320  
EM324  
EM415

**Design Backbone** – provides a comprehensive design experience across the curriculum.

**Support Courses** – provide specialized design experience related to a particular course.

EM215  
Intro. to M. E.



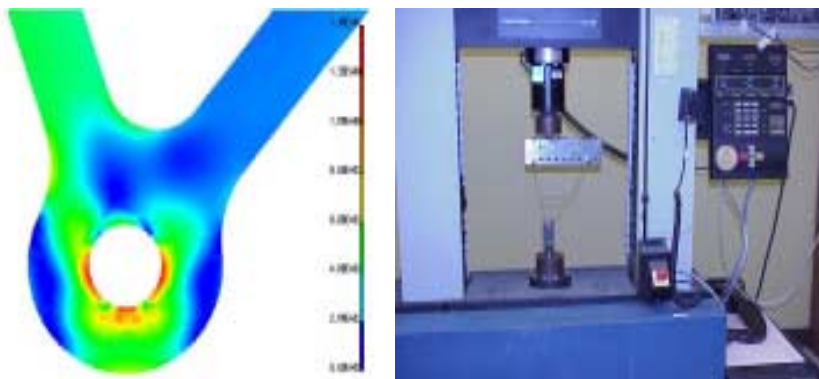
- Design Process
- Project Management
- Design and Build

EM375  
Experimentation



- Data Acquisition and Reduction
- Design of Experiments

EM371  
Intro. to Design



- Machine Component Design
- Failure Prediction

EM477  
CAD



- System Design and Modeling

## EM472 M.E. Design

**Capstone Experience:** Student teams propose, design, and build project of their choosing.

Project duration 1.5 semesters.

Some projects are completed as part of national competitions,

FIRST Robotics

SAE Formula Car

ASME Student Design

**Check Student Activity sections of Society WEBSites for additional ideas**



# ME Tracks

- Energy Systems
- Engineering Mechanics
- Marine Propulsion
- Materials Engineering
- Nuclear Engineering

The key is how you spend your electives...

Questions?